Evaluation Findings
for the Commonwealth of Virginia's

Chesapeake Bay National Estuarine Research Reserve Program

October 1998 - March 2003

Office of Ocean and Coastal Resource Management
National Ocean Service
National Oceanic and Atmospheric Administration
United States Department of Commerce

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EXECUTIVE SUMMARY

A. OVERVIEW

Sections 312 and 315 of the Coastal Zone Management Act (CZMA) of 1972, as amended, require NOAA's Office of Ocean and Coastal Resource Management (OCRM) to conduct periodic evaluations of the performance of states and territories with federally-designated National Estuarine Research Reserve (NERR) Programs. This document sets forth the evaluation findings of the Director of OCRM with respect to the operation and management by the Commonwealth of Virginia and the Virginia Institute of Marine Science (VIMS) of the Chesapeake Bay Virginia NERR for the period from October 1998 through March 2003. It contains an executive summary of the review findings, a description of the review procedures, a description of the Reserve program, the Reserves' major accomplishments during the review period, evaluation findings and recommendations, a conclusion, and appendices.

It is the conclusion of this evaluation that the Reserve is meeting its program requirements satisfactorily under Section 315 of the CZMA and the program regulations at 15 CFR Part 921. Significant accomplishments and recommendations are summarized below.

B. SUMMARY OF ACCOMPLISHMENTS

The VIMS has made considerable progress in managing the Reserve program since October 1998. Significant accomplishments have been made in the seven areas listed below. These are reviewed in detail in Section IV.

1. **Staff**. The Reserve has effectively managed operations during the evaluation period which included a transition of Reserve manager and other staff in key positions. The Reserve continues to maintain and develop strong partnerships with the state and local coastal decision makers.

2. **Land Acquisition/Facilities/Equipment**. The Reserve successfully completed several projects involving new facilities, acquisition of key land parcels in the York River estuary, and purchasing new equipment. These acquisitions increase the Reserve's stewardship role and ability to provide researchers and other users access to the Reserve. Additional equipment adds to the program's flexibility in providing essential resources and transportation.

3. **Education and Outreach**. The Reserve continues to provide high quality, relevant educational programming to coastal decision-makers, teachers, and K-12 students. Programs are designed to bring the Chesapeake Bay experience to the classroom and to enhance public and nonprofit programs with field based science education.

4. **The Coastal Training Program**. The Reserve submitted CTP planning documents to the CTP technical committee and appointed a CTP coordinator, in preparation for their role in this NERRS initiative.

5. **Research and Monitoring**. The Reserve continues to develop a regionally important research program as well as to participate in NERRS initiatives.

6. **Resource Management**. The Reserve's newly created stewardship section is building capacity, acquiring GIS training and data, and developing regional partnerships on public access projects.

7. **International Partnership**. The Reserve participates in an international partnership through its designation as a sister reserve with the Tianjin Paleocoastal and Wetland Nature Reserve on the Huanghe River in the Peoples Republic of China.

C. SUMMARY OF RECOMMENDATIONS

In addition to the accomplishments discussed above, the evaluation has identified three areas where the program may be improved. These evaluation findings identify two recommendations which take the form of Program Suggestions and one mandatory Necessary Action.

Finding: The previous CZMA Section 312 evaluation contained a recommendation for the Reserve to continue to follow an expansion strategy envisioned at the time of the Reserve's designation ten years ago. Several reasons were given for why this strategy is no longer used, including the Reserve's participation in the newly created Virginia Estuarine and Coastal Research Reserve.

PROGRAM SUGGESTION 1: NOAA recommends that the Chesapeake Bay Virginia NERR postpone expansion into the Potomac, Rappahannock, James, and other lower tributaries of the Chesapeake Bay due to resource constraints. Designation of new components should be re-examined when state resources are sufficient to support the staff and programming at new sites along with maintaining quality work along the York River. The revised management plan should address how the Reserve could support efforts in other tributaries absent designating new components.

Finding: The Reserve has been successful during the evaluation period in expanding programs and responsibilities. Efforts should be made to continue to raise public awareness of the NERR as a part of VIMS and as a part of a national network of protected areas.

PROGRAM SUGGESTION 2: The Reserve is encouraged to explore and implement new strategies for increasing the visibility of its participation in the NERRS.

Finding: The Reserve's management plan has not been updated to reflect program changes as required by NERRS regulations.

NECESSARY ACTION 1: The Reserve is required to submit a draft revised management plan. This plan must be submitted before the end date of the 2002 operations award, NA17OR2478, as described in the task description of this cooperative agreement.

I. INTRODUCTION

The National Estuarine Research Reserve System (NERRS) was established by the Coastal Zone Management Act (CZMA) of 1972, as amended. Sections 312 and 315 of the CZMA require NOAA's Office of Ocean and Coastal Resource Management (OCRM) to conduct a periodic review of the performance of states and territories with federally-designated NERRs. This document sets forth the evaluation findings of the Director of OCRM, National Ocean Service (NOS), NOAA, with respect to the performance of the Commonwealth of Virginia in the operation and management of the Chesapeake Bay Virginia NERR (called the Reserve, or CBNERRVA in this document) for the period of October 1998 through March 2003. This document contains an executive summary, review procedures, program description, accomplishments, review findings and recommendations, a conclusion, and appendices.

The recommendations made by this evaluation appear in bold type and follow the section of the findings in which the facts relevant to the recommendation are discussed. The recommendations may be of two types:

Necessary Actions address programmatic requirements of the CZMA implementing regulations and of the Reserve's management plan approved by NOAA, and must be carried out by the date(s) specified.

Program Suggestions denote actions that OCRM believes would improve the management and operation of the Program, but which are not mandatory at this time. If no dates are indicated, the State is expected to have considered these Program Suggestions by the time of the next CZMA Section 312 evaluation.

Program Suggestions that must be reiterated in consecutive evaluations to address continuing problems may be elevated to Necessary Actions. The findings in this report will be considered by NOAA in making future financial assistance award decisions relative to the Reserve.

II. REVIEW PROCEDURES

A. Overview

The OCRM evaluation staff began its review of the CBNERRVA in February 2003. The Evaluation Team Leader worked with the Estuarine Reserves Division (ERD) in OCRM in the preparation for and conduct of this review. The Section 312 evaluation process involves four distinct phases:

- An initial document review and identification of specific issues of concern;
- A site visit to the Reserve including interviews and public meeting(s);
- Subsequent development of the draft evaluation findings (this document); and
- Preparation of the final evaluation findings based, in part, on comments from VIMS regarding the content and timetables of necessary actions specified in the draft document.

B. Document Review and Issue Development

This phase included an analysis of the following documents of relevance to the Reserve: the federally-approved management plan and environmental impact statement; financial assistance awards and work products; quarterly and annual performance reports; previous evaluation findings; official correspondence; additional research and education grant proposals; and other relevant documents and information.

Based on this review, and in conjunction with discussions with ERD staff, the evaluation team identified as priority issues:

- Status of general administration of the Reserve, including facilities development, land acquisition, and the updating of the Reserve's management plan;
- Status of implementation of the Reserve's research, monitoring, and education programs;
- Status of Reserve staffing and needs;
- CBNERRVA coordination efforts with the Chesapeake Bay MD NERR (CBNERRMD), and the Virginia Coastal Zone Management Program (VA CZMP)
- The manner in which CBNERRVA coordinates with other federal, commonwealth, and local agencies and programs; and
- Major accomplishments during the review period.

C. SITE VISIT TO VIRGINIA

Notification of the scheduled evaluation was sent to: the VIMS as the lead management agency; relevant Federal agencies, and to regional newspapers. In addition, a notice of NOAA's "Intent to Evaluate" was published in the Federal Register on March 7, 2003.

A site visit to Virginia was conducted from April 28 - May 1, 2003. The OCRM Evaluation Site Visit Team consisted of Susan Melnyk, Evaluation Team Leader, Chris McCay, Program Analyst, National Policy and Evaluation Division, Cory Riley, Program Specialist, ERD, and Carol Towle, Manager, CBNERRMD.

During the site visit, the evaluation team interviewed the Reserve manager and staff, senior VIMS administrators, researchers, educators, government officials, students, and representatives from the private sector. Appendix A contains a listing of individuals contacted during this review.

As required by the CZMA, an advertised public meeting was held by NOAA on Wednesday, April 30, 2003 at 7:00 p.m. in the Wilson House Seminar Room at VIMS in Gloucester Point, Virginia. Members of the general public were given the opportunity to comment on the operation and management of the Reserve. A list of public meeting attendees can be found in Appendix B. Appendix C contains the response to written comments.

III. RESERVE PROGRAM DESCRIPTION

A. The National Estuarine Research Reserve System

The Coastal Zone Management Act of 1972, as amended, established the National Estuarine Research Reserve System (NERRS) which is funded cooperatively by NOAA's OCRM and participating states or territories, and managed by states or territories, universities and nonprofit organizations. A protected areas network of federal, state, and community partnerships, the NERRS serves to promote informed management of the Nation's estuarine and coastal habitats through linked programs of scientific understanding, education, and stewardship. To date, NOAA has designated 26 coastal Reserves in 21 states and Puerto Rico, totaling more than 1,000,000 acres of protected estuarine lands and waters, which represent 17 of 29 biogeographic subregions identified by the NERRS.

B. Chesapeake Bay NERR in Virginia

1. Background and Description of the Reserve

The Chesapeake Bay Reserve in Virginia contains four site components located along the salinity gradient of the York River, which is one of the major tributaries feeding into the lower Chesapeake Bay. The Chesapeake Bay is the largest estuary in the U.S. and even after centuries of intensive use, is a highly productive biological system, supporting more than 3,600 species of plants, fish and animals. For centuries, the Bay and its tributaries have sustained the region's economy and defined its traditions and cultures. The Reserve is classified in the Chesapeake Bay subregion of the Virginian Province, along with the CBNERRMD.

The Bay receives about half of its water volume from the Atlantic Ocean, and the rest drains into the Bay from a 64,000 square-mile drainage basin that also extends into Maryland, Pennsylvania, Delaware, West Virginia, and New York, resulting in a complex and diverse ecosystem. The Bay is about 200 miles long. Its width ranges from 3.4 miles to 35 miles near the mouth of the Bay, and its average depth including all tributaries is about 21 feet.

Development of NERRS programs in the Chesapeake Bay began in the early 1980's. This initial activity received a major impetus through the implementation of the 1987 Chesapeake Bay Agreement. This compact united the Governors of Maryland, Pennsylvania, and Virginia, the Mayor of the District of Columbia, and the federal government, through the U.S. Environmental Protection Agency, to develop and carry out a joint strategy for protecting and restoring the Chesapeake Bay.

The establishment of a system of research reserves was part of a long-range plan to provide the research community with protected sites for long-term research that are representative

of the range of habitats found along both the tributaries and the main stem of the Bay. This approach, as cited in the previous evaluation findings, "is also to address different land-use patterns which characterize the drainage basin of each tributary and to allow research on and monitoring of the effects of development in those drainage basins." The four CBNERRVA component sites being managed along the York River represent the different ecological zones as defined by the Chesapeake Bay segmentation scheme. These components include the Goodwin Islands, Catlett Islands, Taskinas Creek, and Sweet Hall Marsh.

The Goodwin Islands consist of an archipelago of salt marsh islands surrounded by beds of submerged aquatic vegetation, oyster reefs, and shallow open estuarine waters. Located on the western shore and at the mouth of the York River, within Mobjack Bay, the 1,607-acre site represents a polyhaline salinity regime of 18-22 parts per thousand (ppt). These islands are owned by the College of William and Mary and are managed for research and education, with limited public access. The islands are accessible only by boat, and the largest of the islands is forested.

The Catlett Islands are parallel ridges of forested wetlands surrounded by salt marshes, shallow water, and sandy shoals. Located 19 nautical miles upstream from the mouth of the York River in Gloucester County, the 910-acre site represents mesohaline conditions (8-18 ppt). Historically prevalent submerged aquatic vegetation no longer occurs here. The islands are privately owned and have been incorporated into the Reserve through conservation easements and a management agreement. The adjoining Timberneck Farm is being worked as it has since 1793 by the Catlett family. Use of the Reserve portion requires a permit and the islands are accessible primarily by boat.

Taskinas Creek consists of a tidal creek with fringing marshes that is brackish at the creek's mouth and freshwater at its upper limits. Located 24 nautical miles upriver on the western shore in James City County, the 525-acre component represents the transition zone (3-13 ppt) along the salinity gradient. A great part of the creek watershed is undeveloped and lies within the boundaries of the York River State Park. The site is accessible during park hours and under park regulations. The Park offers self-guided hiking trails, bridle paths, guided canoe trips, and picnic areas on a year-round basis, although the visitor center is closed in the winter. A Memorandum of Agreement between VIMS and the Virginia Department of Conservation and Recreation governs the basis for a cooperative program at Taskinas Creek.

The 1,393-acre Sweet Hall Marsh component occupies a broad meander of the Pamunkey River, one of two rivers that join to form the York River, and is noted for being one of the most pristine rivers on the East Coast. It contains an extensive tidal freshwater marsh with adjacent non tidal bottomland hardwood to the north and shallow flats to the south. This combination of ecosystem types within the upper reaches of the York River, 37 nautical miles from the mouth, is representative of tidal freshwater conditions (0 - .5 ppt salinity). The site is privately owned. VIMS entered into management agreements with the Tacoma Hunting & Fishing Club, and the

Chesapeake Corporation, which owns the upland area and periodically harvests it for pulpwood. Research and educational projects are conducted on the site with access only by permit.

2. Reserve Administration

The Reserve was designated in January 1991, and is operated and managed by VIMS, located at Gloucester Point near the mouth of the York River. VIMS is a component of the College of William and Mary (CWM), and is the Commonwealth's designated marine research laboratory. The Reserve management plan is implemented through a cooperative network made up of the following entities:

- The CWM Board of Visitors holds title to Reserve properties and serves as grantor on donated conservation easements:

- The CWM Endowment Association holds gifts donated to the College for the Reserve that are not transferred to the Board of Visitors or donated directly to VIMS;

- The Department of Environmental Quality (VA DEQ), as the Commonwealth's designee for receiving funds under the CZMA to administer the VA CZMP, solicits proposals from VIMS and other qualified applicants for projects that contribute to the mission of the VA CZMP, some of which are conducted at the Reserve;

- Virginia Department of Conservation and Recreation's Division of State Parks manages the York River State Park (YRSP) and cooperates with VIMS to manage jointly the Taskinas Creek component located within the YRSP;

- Other agencies, such as the Virginia Marine Resources Commission and the Virginia Department of Game and Inland Fisheries, are responsible for conducting surveillance and enforcing applicable statutes and regulations at the Reserve components; and

- Private landowners cooperate with VIMS under the terms of conservation easements or management agreements.

The Reserve has established standing committees to advise it on its research and monitoring, education, and stewardship activities. Committee members are representative of the broad range of partnerships developed and maintained through time. The Reserve also benefits from VIMS' participation in a formal network of committees established at the state and federal level.

IV. ACCOMPLISHMENTS

A. Staff

The CBNERRVA staff takes an active role in furthering the goals and objectives of the NERRS and show commitment to their responsibilities in furthering programs and partnerships. There is a great deal of interaction that occurs among state, federal, local, and community organizations in providing technical support on coastal management issues. Some examples of the advisory services they provide to the VA CZMP include:

- Maintaining an active role on the Coastal Policy Team, which includes representatives from local governments and coastal program agencies. The Team provides a forum for management issues and coordinates a shoreline management program;

- Participation in the Virginia Coastal Partners Workshop, which was attended by local, state, and federal coastal resource managers and focused on the 2001 Virginia State of the Coast Report;

- Assistance with the VA CZMP Seaside Management Plan, a program for SAV research and restoration;

- Assistance with the VA DEQ Office of Surface and Water Quality's development of water quality standards for regional water quality monitoring systems;

- Coordination of Coastal Decision Maker Workshops (CDMW) for local, state, and federal coastal resource managers;

- GIS support, technical training, field trips, and live animal displays for the Virginia Oyster Heritage Program;

- Participation on the Dragon Run Steering Committee in the development of the Dragon Run Special Area Management Plan (SAMP), a five-year (2002-2006) collaborative process to develop measures to protect the Dragon Run's coastal resources; and,

- Development of residential riparian buffer guidelines for the Chesapeake Bay Local Assistance Department (CBLAD).

CBNERRVA staff is active in NERRS initiatives. The Reserve manager is a member of the NERRA Executive Committee and is chairperson of the System-wide Monitoring Program (SWMP) Nutrient Build-out Committee. He served as the chairperson on the System-wide Data Management Committee to provide guidance to the Central Data Management Office (CDMO), and editor of the research coordinator's newsletter. The research coordinator serves as co-chairperson on the SAV biological monitoring workgroup. The Reserve hosted the 2000 Research Coordinators Meeting. Held in March, participation included ERD, the NERRS, the Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET), and the CDMO.

Logistics for the October 2000 NERRS workshop held in Williamsburg, Virginia, were also coordinated by CBNERRVA. The Reserve participated in 16 other System-wide committees, including the CTP technical committee, communications, education, and restoration science committees. The Reserve staff is successful at strengthening and fostering relationships within VIMS and among Reserve partners in complementary research, resource stewardship, and environmental education programs.

Members of Reserve staff were the recipients of awards during the evaluation period as well. The Reserve manager and the stewardship coordinator were recognized by the Coastal America 2000 Partnership Award for their work as part of a team which included participants from the National Aquarium in Baltimore (NAIB), federal, state, and local government agencies, universities, and community organizations. Staff provided long term water quality and meteorological monitoring at a 10-acre tidal wetland restoration site that was created at Fort McHenry National Park as a wetland mitigation site for the construction of the Ft. McHenry Tunnel near Baltimore, Maryland. The Park is visited by approximately 600,000 visitors annually.

During the evaluation period, the Reserve was in transition due to vacancies in key positions and the initiation of additional programs. During this time the research coordinator acted as Reserve manager and recruited for the open positions of research coordinator, education coordinator, Coastal Training Program (CTP) coordinator, stewardship coordinator, and laboratory supervisor. The new staff brings to the program years of relevant experience with the Chesapeake Bay and VIMS.

B. Land Acquisition/Facilities/Equipment

The Reserve made considerable progress in expanding its land holdings, facilities, and procured essential equipment. The Reserve efforts to expand its holdings on the York River included sometimes extensive negotiations between buyer and seller on critical land parcels, and required the Reserve staff to navigate newly developed federal and state regulations. Staff also successfully coordinated grant management requirements in facilities and equipment procurement

and construction planning. The Reserve interacted with the many different entities for each transaction and demonstrated flexibility during the process. The site visit confirmed the value to the research community and Reserve partners of having pristine research sites, facilities, and access to conduct programs.

The land acquisition projects during the evaluation period were undertaken to expand the Reserve as envisioned in the Reserve's Management Plan and to provide long term resource protection in the lower Chesapeake Bay watershed. Their acquisition projects included participation in the Coastal and Estuarine Land Conservation Program (CELCP) as well as NERRS funding. The CELCP was created to "protect important coastal and estuarine areas that have significant conservation, recreation, ecological, historical, or aesthetic values, or that are threatened by conversion from their natural or recreational state to other uses," pursuant to the authority of P.L. 107-77 of the CELCP. CELCP acquisitions during the evaluation period include the following:

- The Harrison Tract. This project included ERD, VA's Department of Conservation and Recreation and the Trust for Public Land. The acquisition project resulted in the protection of a 45-acre tract adjacent to the York River State Park (YRSP) in James City County. The tract contains critical habitat and will provide a protected research site as well as supplementing park programming and operations. The acquisition of this property was critical in preventing encroaching development adjacent to the Park. The parcel is adjacent to the current NERR boundary and the Reserve will be working with the YRSP to officially incorporate this piece of land into the Reserve.

- The Dragon Run New Bridge land tract. The Dragon Run New Bridge land tract was incorporated into the Virginia Estuarine and Coastal Research Reserve. Created in 1999 by the Virginia General Assembly, the Coastal Research Reserve component is to be managed by VIMS in coordination with CBNERRVA. The Dragon Run New Bridge land tract is not part of the NERR, and is not adjacent to the Reserve. The Dragon Run is a fresh and brackish stream which flows forty miles through the Virginia Middle Peninsula counties of Essex, Gloucester, King and Queen, and Middlesex and empties into the headwaters of the Piankatank River. The area is unique in that it contains excellent water quality, diverse flora and fauna, dense stands of hardwoods including sycamores and bald cypresses, and supports recreational fishing and wildlife. The Dragon Run was listed as the second most significant Chesapeake Bay habitat and water body in the Smithsonian Institute's Center for Natural Areas "Natural Areas of the Chesapeake Bay Region: Ecological Priorities" (1974). It ranked as Virginia's most significant tributary stream to the Bay. Subsequent concern for the protection of this valuable resource and support from the Commonwealth have resulted in the promotion of community-based efforts to preserve the cultural, historic, and natural character of the Dragon Run. This was an important acquisition for the Commonwealth.

- Using Section 315 funding, the Reserve completed the acquisition of a 65-acre tract of land in the Catlett Islands which ensures control of the down river end of the islands. This parcel is within the current Reserve boundary and purchasing this land ensures the resource protection for research activities and education opportunities as part of the regional water trail system effort. The water trail is to be a self-guided educational trail for canoeists, kayakers, and small boaters.

Facilities enhancements include the 2000 purchase and renovation of the property adjacent to the VIMS campus for the VIMS Gloucester Point Campus headquarters administration building. Renovations were made on the Wilson House in order to comply with Americans with Disabilities Act and fire code regulations. Staff has occupied the new headquarters building since December 2002; the building contains offices, a conference room, a break room, and a classroom. Plans are continuing for the design and construction of a research and education laboratory facility directly adjacent to the Wilson House. Ground breaking will occur May 2004. The facility will contain wet labs, storage, teaching labs, and staff rooms encompassing approximately 5,400 square feet.

The Reserve purchased a truck to be used for research and education programs, and a vessel which is used for access to research project sites, water quality monitoring stations, to conduct data flow sampling monthly, and to provide transport for education programs. The acquisition of this equipment is a significant contribution to the self sufficiency and flexibility of program operations.

C. Education and Outreach

The CBNERRVA is active in the community, offering outreach and education through established programs as well as increasing its scope through new partnership opportunities. With a new education coordinator starting in October 2001, the Reserve benefits from his six years of experience in leading field-based education programs. Only recently completing a full year cycle of program development and implementation, the education program offers relevant topics and hands-on experience.

Programs are conducted at Taskinas Creek, Reserve headquarters, and other locations around the Commonwealth with partners including VIMS, the VA CZMP, the VA DCR, and Virginia Sea Grant. The Reserve works to evaluate and plan programs that embrace the NERRS mission and align with the objectives of the Chesapeake Bay Program: (1) to get students connected to the Bay by providing a meaningful Bay or outdoor stream experience, and (2) to provide opportunities for local restoration and resource protection projects. The program is also responsive to requests to link to classroom learning and Virginia's Standards of Learning as identified by the Virginia Department of Education.

Programs conducted by the Reserve for high school students include: presentations to oceanography and marine biology classes; field trips; a mentorship program including SWMP bio-monitoring training and internships at the NAIB, and a 2-day field-based program for students participating in a Greater Richmond Area Health Education Consortium to offer a broad variety of science education programs. Multi-day field trips are conducted during the summer which provide science programming for middle and high school students. The Reserve program has become involved with more than 80 school programs during the year. These programs are seen as a valuable resource by the community in meeting the educational needs of their students.

The Reserve participates in a cooperative partnership with the Gloucester County Rotary Club in their annual Chesapeake Bay Conference for outstanding high school students. Students learn about the Bay through thematic programs such as *Blue Crab and the Blue Crab Fishery* and *Habitat*. The Reserve partnership expands the scope of the program by adding field-based science elements to the historical, economic, and sociological components of the Conference.

In addition to student programs, the Reserve provides programs for educators, including a 3-day program for teachers entitled *Restoration on the York River: Oysters, SAV, and Salt Marsh*, a program which provided the ten participants field experience on a local restoration project. A teacher workshop entitled *Estuarine Aquarium Keeping in the Classroom* provided educators the tools to maintain aquariums in the Yorktown Elementary Math, Science, and Technology Magnet School containing estuarine habitat and species. During the site visit, the evaluation team viewed a video showing highlights of a field trip taken by 45 teachers and staff of Yorktown Elementary School as part of fall teacher orientation. The group was given an introduction to estuarine ecology as part of a field trip to the Goodwin Islands. The video was played as part of student orientation to showcase the magnet school's science programming to incoming students and their parents.

The Reserve partnership with the Oyster Reef Keepers of Virginia (ORKV) increases student interest in field based marine science programs and oyster restoration. The ORKV goal is "to restore and maintain oyster reefs in Virginia's waterways through community-based restoration, public education, advocacy, and scientific research and monitoring." Programs are designed for different age groups and cover a wide range of activities. Current projects include teacher training, development of a classroom curriculum to include restoration and monitoring projects, and an interactive Web site.

Estuaries Day celebrations were co-hosted with VA DCR staff of the York River State Park (YRSP) at Taskinas Creek and included presentations, exhibits, and field trips. The Reserve education staff gave presentations at nine local schools on the topic of estuaries prior to the event to encourage attendance by the community. Shallow water habitat displays were developed at YRSP for Estuaries Day, 2001. Earth Day programs at YRSP also involve the Reserve where programs are offered to approximately 300 participants and include beach seining, boat trips and educational displays.

During the early part of the evaluation period, the former Reserve education coordinator, along with associates in the William and Mary School of Law, developed a series of NERR "Coastal Science for Lawyers" pilot workshops aimed at graduate students and practitioners in law and business. The pilot workshops were part of the development of a Coastal Ecosystem Science Program to promote a broad understanding of coastal ecosystem science issues, and included discussions of relating environmental regulations to the interrelationship between science and human activities. The first workshop was held in April 2000 at the New England Aquarium in Boston, a Coastal America Learning Center. More than 50 law students from area schools, including Harvard, Boston College, Boston University, Northeastern, and Suffolk School of Law, attended, as well as Massachusetts Department of Environmental Quality lawyers.

During the evaluation period Reserve staff were involved in a special needs audience project to develop educational programs and products aimed at the physically disadvantaged. The guide, *Introductory Guide for Developing an Environmental Education Program for People with Hearing and Visual Special Needs*, a Tidewater Virginia Natural Resource Box, includes a tape and video products, to accompany a one-day field trip to Taskinas Creek. The videos were developed for schools to use as an introduction to estuarine ecology and field trips to Taskinas Creek.

The program hosted three VIMS Mini Marine Sciences Schools entitled *Water Quality Issues and the Importance of Riparian Vegetative Buffers*. The program is a series of classes held one day a week for four weeks that cover numerous topics including tidal wetlands, riparian buffers, shoreline hardening, and nutrient management. The programs are provided upon request in coordination with community groups and government agencies such as the Department of Defense.

The CBNERRVA offers outstanding Coastal Decision-Maker Workshops to audiences comprising: State and federal agency resource managers; landscape professionals; Master Gardeners; local garden club officials; teachers; researchers; and the general public. The native plant arboretum at Taskinas Creek was created by Reserve and YRSP staff and volunteers. It was an integral part of the workshop entitled *Native Plants and Their Use in Coastal Areas*.

Wetland identification and delineation workshops were well attended by staff of Virginia's Department of Transportation and DEQ. The VIMS Tidal Wetlands Seminar provided technical information on basic ecological management and procedural issues for state resource managers. A class was held for the Master Gardeners' certification program entitled *Riparian Buffers, Native Plants, and Nutrient Management* to provide information and training for suburban homeowners. Another program involved the Reserve and partners CICEET, James City County, Virginia and the North Carolina NERR to develop an on-line broadcast program on the topic of microbial degradation.

The Reserve launched a new Web site in May 2002, *http://www.vims.edu/cbnerr,* which is a comprehensive and informative source for Reserve news and projects. Reserve news is covered in *The Crest*, a quarterly publication which incorporates several institute publications including *a fair Bay* as of March 1999. In addition, the Reserve partners with the VIMS Outreach Department to deliver pilot and established programs and products.

D. The Coastal Training Program

The Reserve is an active participant in the emerging Coastal Training Program (CTP) to provide the best available science-based information, tools, and techniques to professionals making management decisions about the coast. This program will create a permanent forum for people who are involved in making important decisions about the coast. NOAA funding is provided to participating NERRs to complete a needs assessment for their region, develop a constituent database, conduct a market analysis, develop a marketing plan and develop a CTP implementation plan. The CBNERRVA has submitted its requirements for participation in the program to the NOAA technical committee for review.

A CTP coordinator has been appointed to lead the continued development of the program at VIMS. Based on the needs assessment, the topics that the program will focus on include Wetland Plant Identification, Riparian Buffers, and Shallow Water Habitats. Developments also include the expansion and revision of past programs with their partner, the Center for Coastal Resource Management at VIMS. Potential partners for the CBNERRVA CTP include Virginia Tech, VA DEQ, and the CBLAD.

The former education coordinator, along with the Business School of the College of William and Mary, developed a market analysis guide for use by the NERRS containing tools to assess the needs of key audiences and to efficiently advertise and distribute programs. The guide contains the following: a market analysis tool for environmental education; an example of a nominal group qualitative analysis technique; an example of a needs assessment survey; and a primer on the statistical analysis software, SPSS, and data forms for SPSS. The guide is an excellent tool for the NERRS.

E. Research and Monitoring

The Reserve continues to experience an increase in use of Reserve components by visiting scientists and students for thesis and dissertation research, as well as for focused projects addressing regional initiatives and NERRS national research priorities. The Reserve's research priorities include shallow water area studies of water quality and grasses, aquaculture and juvenile fish studies, wetlands restoration and management, and the integration of regional and local monitoring. The CBNERRVA research goals are closely aligned with those of the NERRS.

The Reserve participates and provides leadership in the NERRS research community and has developed an in-house research program based on expertise at VIMS. The Reserve components throughout the York River estuary provide protected areas where CBNERRVA staff coordinated approximately 30 research projects at one time throughout the evaluation period.

Historically, VIMS is mandated by the Commonwealth to provide research, education, and advisory services, and to achieve and maintain a national and international position as a premier marine science institute. The reserve managers as well as the research coordinator are on the faculty at VIMS, and the Reserve is positioned well as its own department that reports directly to the Dean. The CBNERRVA is successful at integrating its technical program with its mandate of providing advisory services.

The research program works on restoration science in understanding emergent and submersed aquatic vegetation (SAV) and the effects of sediment enrichment on plant physiology. The development of a new data flow unit provides a two-dimensional measurement of water quality samples throughout impacted macrophyte communities. Toward this effort, the Reserve devised a data flow mapping system to identify trends and potential changes in monitoring data. The system is contained on the Reserve boat, and uses a PAR sensor connected to a YSI sensor to measure light attenuation in water collected through a chamber system constructed from PVC pipes.

The Reserve worked with the VA DEQ Office of Water Quality Programs to develop regional criteria for water quality standards, DO levels, and designated use issues. These criteria will be used to inform EPA amendments to water quality standards regulations and will be used in developing new total maximum daily load standards (TMDLS). [1] As a part of VIMS, the Reserve will be on the technical advisory committee in the rule making process to amend the water quality standards regulation for setting TMDLS in Virginia for Chesapeake Bay nutrient criteria. Shallow water monitoring, surface mapping and data flow will be used to measure whether the new criteria work.

Groundwater dynamics in coastal settings and benthic material flux is another component of the Reserve's research program which contributes to the regional research effort on the lower Chesapeake Bay. One application of this study is the use of riparian buffers to stop nitrogen input into rivers. The program uses GIS to identify buffer planting locations in the field and monitor high levels of groundwater discharge (nitrogen). Research of shallow water communities provides relevant data on aqua-culture including the impacts of clam and oyster culture on SAV restoration.

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[1] A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. Water quality standards are set by States, Territories, and Tribes. They identify the uses for each water body, for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support that use.

The Reserve participates and provides advisory services on many regional projects including:

- The VIMS Seagrass Restoration Program effort to promote the reestablishment of SAV in the lower Bay including seeding and transplanting, and water quality management;

- The VA CZMP Seaside Heritage Program eelgrass seeding, fixed station and surface water quality mapping, and the eco-tourism guide and education/certification program;

- The Department of Defense riparian buffer demonstration plantings at the Turkey Road, Yorktown Naval Weapons Station, a former weapons storage area;

- Essential fish habitat research examining the importance of intertidal habitats to commercial and ecologically important fin and shellfish and characterization of resident and transient fauna associated with constructed oyster reef habitats;

- Measurement of watershed changes and effects on the lower Bay system using the Bay eutrophication model; and

- Nekton utilization studies of shallow water habitats throughout the lower Bay to include un-vegetated habitats, edge effects, and altered shorelines.

Participation in NERRS initiatives was high throughout the evaluation period, including CBNERRVA staff involvement on five research coordination committees. The Nutrient Monitoring Committee, chaired by the Reserve manager, involved field testing of the YSI chlorophyll probe to determine the feasibility of incorporating a new monitoring protocol into the NERRS. For this study, Chlorophyll a monitoring was conducted for six months at the Goodwin Islands SWMP station. Results were documented in the field report, and incorporated into a report entitled *Performance of the YSI 6025 Chlorophyll Probe at selected NERRS Sites*, by A. Loher.

The Reserve added two data logger stations in 2002 as part of the SWMP build-out to measure inorganic nutrients. Stations are located in the Goodwin Islands, Clay Bank, Taskinas Creek, and Sweet Hall Marsh. These data loggers collect data on water temperature, conductivity, salinity, pH, dissolved oxygen, depth, and turbidity and report on 15 minute intervals. Monthly nutrient and Chla grab samples are taken at all Reserve components, as well as monthly diel sampling of nutrients and Chla done at Taskinas Creek. The Reserve has maintained a weather station since 1998 as part of the SWMP program which collects data on air

temperature, relative humidity, rainfall, barometric pressure, wind speed and directions, and photosynthetic active radiation (PAR). These data, along with the water quality data, are submitted to the CDMO which manages all system wide data. The Reserve is up to date on all data submission and has made significant contributions to the national system in equipment testing, technical support, and submission of high-quality, timely data according to the CDMO.

The Reserve participates in the NERRS Graduate Research Fellowship (GRF) Program with a strong field of candidates applying to the program at the Reserve. The Reserve has hosted seven students and over nine years of study through the Program. Benefits to the students include office space and equipment, involvement with the research community, and a teaching outreach link. Fellows received GIS ArcView training and participated in the Dragon Run watershed planning which gave the students experience with and exposure to applied research. Janet Nestlerode, GRF from June 1999 - May 2001, studied oyster reef architecture and oyster population development, and Scott Leberg, GRF from June 2001 - May 2003, studied benthic secondary production of tidal marsh habitats. GRFs contributed to the SWMP monitoring program at the Reserves by performing the calibration of data loggers, data collection and management duties, procurement of additional equipment, and analysis of monitoring requirements for program expansion.

The Reserve provides research and educational opportunities through its cooperative relationship with Morgan State University. As part of the Reserve Partnership Project for under-represented and minority students in July 2002, the Reserve provided training to the students and equipment to the university for use in the following: formal instruction on the meteorological functions of the monitoring equipment, field and water quality analysis, YSI Data Sondes, Nekton Surveys , and Benthic Infauna. A SWMP station was set up in Fort McHenry Channel, Baltimore Harbor to demonstrate the use of SWMP equipment, the Protected Area Geographical Information System (PAGIS) and SWMP protocols using real-time data for NAIB interpretation of estuarine ecology.

The Reserve is making progress on its site profile by developing an annotated bibliography of research conducted within the CBNERRVA. Developed by research staff and graduate fellows, the bibliography contains extensive literature searches on various aspects of the natural history ecology of the York River component of the Reserve and a compilation of existing databases, reports, and publications. The information is available on the CBNERRVA Web site, *http://www.vims.edu/cbnerr/research/literature.html*.

F. Resource Management

Since 1999, the Reserve has added a resource stewardship focus to the Reserve program. Stewardship activities have included geographical information system (GIS) training and development, developing hunting and stewardship plans, and integrating public access policies.

The Reserve staff received NOAA Coastal Services Center (CSC) PAGIS funds for the development and use of spatial data layers in research and monitoring programs. Reserve staff including the reserve manager, resource stewardship coordinator, and GRF, received up-to-date GIS training through the CSC as well as the Virginia Polytechnic Institute and State University.

GIS spatial analysis tools and an internet-based spatial data delivery system are used to access and interpret important thematic information for ongoing management of coastal areas. Data layers acquired include water quality and flow monitoring systems, meteorological stations, groundwater wells, nekton sampling stations, and long-term vegetation transects. The Reserve acquired current digital ortho quad maps and low aerial photography for incorporation with the spatial data system.

The resource management efforts have strengthened the Reserve's coordination of the lands within the NERR boundaries. Use of GIS in stewardship activities include mapping of fire impacted monitoring sites, and hunting and duck blind locations as part of a trail system mapping project at YRSP. This data will be used as part of an integrated monitoring system for Reserve managed lands.

The Reserve has been an active part of the Commonwealth effort to address the needs of a variety of users, including boaters, birders, bikers, and hikers by their participation in sustainable community efforts. The Goodwin Island and Taskinas Creek components were included in the Virginia Coastal Area Birding and Wildlife Trail as part of the Lower Peninsula Loop. The trail uses existing roadways that link parks, refuges, and specially selected private lands throughout the Virginia coastal zone. The trail adds to the recreational and public access opportunities in the Commonwealth and allows for the observation of birds and wildlife in their natural habitats. Additionally, these sites have been nominated as part of the newly created water trail system, the York River Water Trail. The water trail system is an innovative response to growing public demand for meaningful recreation that also protects, preserves, and maintains natural and cultural corridors.

Taskinas Creek and the Goodwin Islands are two key components of the Algonquin Trace, a newly created nature and culture-based interpretive water trail system which provides access to and interpretation for resources found on the York, Mattaponi, and Pamunkey Rivers. The Mattaponi and Pamunkey Rivers Association initiated the project, which is planned to link

together a multi-site network of 10 interpretive wayside kiosks and exhibits at water access sites, bicycle and walking trail heads, and wilderness overnight family campsites. The primary interpretive focus for the water trail is that of the natural environments and surroundings, land use practices, and native culture present in Virginia immediately prior to English contact and settlement in the early 1600s.

G. International Partnership

The Reserve has an international partnership through its designation as a sister reserve with the Tianjin Paleocoastal and Wetland Nature Reserve on the Haunghe River in the Peoples Republic of China. Under the 1979 US-China Science and Technology Agreement, China's State Oceanographic Administration (SOA) and NOAA cooperate to increase funding and contacts for research projects based on similar management challenges. In May 2000, Reserve staff traveled to Tianjin to meet with agency managers, discuss progress on current projects including planning for public education, outreach and ecotourism, and to determine their capabilities and resource needs. The meeting resulted in a development of a general cooperation intention outlining the two agencies' goals and objectives for cooperation including: (1) exchange of data, documentation, and research materials in fields of mutual interest; (2) exchange of scholars, researchers, administrators, and students, (3) coordination of such activities as joint research, lectures, seminars, workshops, and symposium. This partnership has resulted in the establishment of a foundation to begin vegetation and water quality monitoring and the initiation of a GIS and data management program.

VI. REVIEW FINDINGS AND RECOMMENDATIONS

Finding 1: Response to the Last Evaluation Findings

The last evaluation findings document, dated January 26, 1999, contained a recommendation for the Reserve to continue with its expansion plans. "As part of the Reserve's management plan revision and in cooperation with NOAA, the Commonwealth is encouraged to revisit and resolve its commitment for the long-term expansion of the Reserve into other lower Virginia tributaries, as envisioned at the time of the Reserve's nomination ten years ago."

It was originally envisioned that the CBNERRVA would expand to include 20 components to cover a lower Chesapeake Bay tributary salinity segmentation scheme. The expansion was to occur in four phases: 1) York River Basin; 2) Rappahannock and Potomac River Basins; 3) James River Basin and western shore of the Chesapeake Bay; and 4) Bayside Eastern Shore of the Chesapeake Bay.

Shortly after the 1999 CZMA Section 312 evaluation, the governor of Virginia and VIMS submitted a designation package to ERD for the addition of eleven sites on the Potomac and Rappahannock Rivers. Over the past few years the new Reserve manager, Reserve staff, the program liaison and the ERD chief have examined the practicality of implementing the expansion plan. CBNERRVA has done an excellent job in implementing quality education, research, and monitoring programs along the York River.

Expanding the Reserve to eleven additional sites would stretch the existing staff and resources to such an extreme that little benefit could come to new sites, and the York River components would suffer from neglect. Operating systemwide activities and coordinating a unified identity and purpose have been challenging for other multi-component sites within the reserve system. Throughout the site visit, it became apparent that the Reserve staff are also time limited and are focusing on addressing resource management, land acquisition, and research and educational programming that is relevant to the York River. In addition, completing the designation of new components would require limited ERD staff time.

The original plan for the CBNERRVA is enormous, complex, and extremely ambitious. NOAA supports Reserve efforts to promote estuarine understanding in the Rappahannock and Potomac River Basins and in all of the Chesapeake Bay's lower tributaries. However, the addition of new component sites at this time would tax the existing staff and resources at the CBNERRVA. If state funds become available in the future, NOAA and the CBNERRVA could re-evaluate the efficacy of expanding beyond the York River. Until that time, the CBNERRVA should continue to focus resources on the development of programs at the existing sites along the York River.

Program Suggestion 1: NOAA recommends that the CBNERRVA postpone expansion into the Potomac, Rappahannock, James, and other lower tributaries of the Chesapeake Bay due to resource constraints. Designation of new components should be re-examined when state resources are sufficient to support the staff and programming at new sites along with maintaining quality work along the York River. The revised management plan should address how the Reserve could support efforts in other tributaries absent designating new components.

Finding 2: Visibility of the NERR

Throughout the site visit, the CBNERRVA's role as part of the national system of reserves was recognized by program partners. Partners highlighted value of the national program when developing partnerships and programs in several discussions. In addition, many of the national initiatives and committee work has resulted in beneficial outcomes for the community.

VIMS' resources are a large part of Reserve operations and contribute to the success of it's programs as well. This includes a large pool of experts in many subjects who contribute to programs, the availability of equipment and facilities for programs and research activities, the research library, the Public Relations Department, and the Center for Coastal Resource Management, to name a few.

VIMS has built an excellent local and national reputation as a premier marine science institution. As a staple of the community for decades, VIMS may receive greater local name recognition than the National Estuarine Research Reserve System among its users. The Reserve must therefore work hard to emphasize that their programs are a part of a larger, national system.

Another issue that may confuse efforts to gain name recognition for the Reserve is that the CBNERRVA staff also administer the Virginia Estuarine and Coastal Research Reserve System, a state program. Efforts should be made to continually communicate the difference between these programs to Reserve staff, the VIMS community and to the public.

For these reasons, NOAA encourages VIMS to incorporate more mention of the NERRS and the CBNERRVA participation as part of the national system.

Program Suggestion 2: The Reserve is encouraged to explore and implement new strategies for increasing the visibility of its participation in the NERRS.

Finding 3: Management Plan Revision

Every reserve is required by the NERRS regulations to have a NOAA-approved management plan (15 CFR 921.30(a)(4)). The plan must describe the reserve's goals, objectives, and management issues, and it must identify the reserve's objectives for research, education/interpretation, public access, construction, acquisition, and resource preservation and restoration (15 CFR 921.13(a)(1-12)). A reserve's initial management plan and any major proposed changes to an existing plan are made available for public comment at the national and local levels before receiving NOAA's final approval. Management plans must be updated every five years (15 CFR 921.33(c)).

The CBNERRVA has been operating successfully according to its federally-approved program and it management goals during the evaluation period. Priority has been given to carrying out the findings of the last CZMA Section 312 evaluation, in the search for replacements to fill open positions of research coordinator, and education coordinator, and in securing support for newly created positions of CTP coordinator, stewardship coordinator, and laboratory supervisor. New staff members have been a tremendous asset to the program and bring with them valuable experience. The program has grown by developing new partnerships and programs.

The current management plan needs revision to reflect the changes that have occurred during the last two evaluation periods, including staff, programs, and management goals. NOAA identified the need to clarify the direction and strategy of the stewardship program. Management goals need to be clearly defined in structuring the duties of the program and how to include other partners in concert with NERRS goals.

The CBNERRVA is advised to work with ERD to create and implement separate elements of its management plan for the research, education, and stewardship sections of the program. NOAA is requiring the Reserve to begin the process of compiling the elements of the management plan. This requirement entails close coordination with ERD in determining a time line and plan for completion of the revised CBNERRVA management plan consistent with NERRS regulations and guidelines.

Necessary Action 1: The Reserve is required to submit a draft revised management plan. This plan must be submitted before the end date of the 2002 operations award, NA17OR2478, as described in the task description of this cooperative agreement.

VI. CONCLUSION

Based on the recent evaluation of the Chesapeake Bay National Estuarine Research Reserve, I find the Virginia Institute of Marine Science is adhering satisfactorily to the programmatic requirements of the NERRS in its operation and management of the Reserve. The Reserve has made significant process in the following areas: (1) staff; (2) land acquisition/facilities/equipment; (3) education and outreach; (4) the Coastal Training Program; (5) research and monitoring; (6) resource management; and, (7) international partnership. The evaluation findings also contain two Program Suggestions and one Necessary Action that should be considered by VIMS prior to the Reserve's next Section 312 evaluation.

This is a programmatic evaluation of the Reserve that may have implications regarding the Commonwealth's financial assistance awards; however, it does not make any judgements on, or replace any financial audit(s) related to, the allowability or allocability of costs incurred.

_____ _____

Date

Eldon Hout, Director
Office of Ocean and Coastal Resource Management

Appendix A

LIST OF PERSONS CONTACTED

Virginia Institute of Marine Science

William G. Reay, Director, CBNERRVA, Research Assistant Professor of Marine Science

Carolyn Gardner, Administrative Assistant

Ken Moore, Research Coordinator, Assistant Director, Associate Professor of Marine Science

Eric Wooden, Stewardship Coordinator

Bob Caroll, Education Coordinator

Bill Roberts, CTP Coordinator

Scott Lerberg, NERRS Fellow

Janet Nestlerode, NERRS Fellow

Betty Neikirk, Marine Scientist II

Britt Anderson, Marine Scientist I

Joy Austin, Laboratory Supervisor

Carl Hershner, Center for Coastal Resources Management, Director, Associate Professor of Marine Science

Roger Mann, Director of Research and Advisory Service

Page Hayhurst, VIMS Development Office, Director,

Jane Lopez, Grants Office, Director of Sponsored Programs,

Kirk Haven, Center for Coastal Resources Management, Assistant Director

David Malquist, Director of Communications

Susan Maples, Outreach Coordinator

Nancy Wilson, Web Master

Institute Scientists

John M. Brubaker, Associate Professor of Marine Science

Romuald N. Lipcius, Professor of Marine Science

Kenneth A. Moore, Associate Professor of Marine Science

Robert Diaz, Professor of Marine Science

Robert J. Orth, Professor of Marine Science

Richard L. Wetzel, Chair, Department of Biological Sciences

Iris C. Anderson, Professor of Marine Science

Program Partners

Virginia Department of Environmental Quality, **Virginia Coastal Program**
Laura McKay, Program Manager
Shep Moon, Coastal Planner
Julie Bixby, Coastal Planner
Virginia Witmer, Outreach Coordinator

Virginia Department of Environmental Quality, **Office of Water Quality**
Al Pollack
Rick Hoffman

Virginia Department of Conservation and Recreation
Tom Cervanak, York River State Park - Taskinas Creek Component, Park Manager,

Virginia Sea Grant Program
Vicki P. Clark, Marine Education Specialist

U.S. Department of Defense
Glenn Markwith

Gloucester Courthouse Rotary Club
Frank Wingfield, Vice President

Middle Peninsula Planning District Commission
David Fuss Dragon Run SAMP, Director
Lewis L. Lawrence, Director of Regional Planning

Tianjin Wetland Preserve and EIGERT
James Perry, Associate Professor, College of William and Mary

Yorktown Elementary Math, Science, and Technology Magnet School
Cathy Cheney, Principal Upper Classes
Mary Ahearn, Principal Primary Classes

Oyster Reef Keepers of Virginia
Laurie Sorrebella, Executive Director

National Aquarium in Baltimore
Glen Page, Director of Conservation

Appendix B

PUBLIC MEETING ATTENDEES

April 30, 2003
Wilson House Seminar Room
Virginia Institute of Marine Science
Gloucester Point, Virginia

Chip Neikirk	Virginia Marine Resources Commission
Kenneth Moore	CBNERRVA
Sally Moore	Chesapeake Cultures
Frank Parker	VIMS
Mimi Beckwith	VIMS Development Office
Eric Wooden	CBNERRVA
Carolyn Gardner	CBNERRVA
William Reay	CBNERRVA
Karen Reay	Virginia Department of Game and Inland Fisheries
Joy Austin	CBNERRVA
Bob Carroll	CBNERRVA

Appendix C

RESPONSE TO WRITTEN COMMENTS

Commenter: Stanley Gemborys, Ph.D
Professor of Biology
Hampden-Sydney College

Comments: Dr. Gemborys wrote in support of the work that the CBNERRVA has done with Ecology and Environmental Biology students at Hampden-Sydney College. Reserve staff and additional VIMS staff provided guided educational tours to the Goodwin Islands and surrounding estuarine ecosystems which was found to be helpful in their educational program.

Response: This is part of the hands on approach to building an educational program by the Reserve which was seen during the site visit as well. The education coordinator has brought his experience in providing educational programs and applied effort in developing new partnerships in the community. The College is 2 ½ hours away from the Bay, but the Reserve is a valuable resource to the College in their effort of providing students with a Bay experience and field experience in estuarine ecosystems.

Commenter: Deanna A. Johnson
Community Education Coordinator
City of Gloucester
Department of Community Education
Walker Coordinator

Comments: The school invited the Reserve to participate in providing outreach programs based on their standards of learning needs. They have found the Reserve to be a valuable resource for their community education team, and compliment the dedication of Mr. Carroll in meeting the educational needs of their students.

Response: The Walker school was visited on our site visit. The students and teachers at the school have benefitted from the assistance given to them by Reserve staff, including teacher training, educational exhibits, and outreach programs.

Commenter: Jorge Gomezjurardo
Senior Aquarist Syngnathid Breeding Program
National Aquarium in Baltimore

Comments: This letter was written in support of Dr. Reay, and CBNERRVA staff for their work on the Aquarium's Seahorse Breeding Program since 1999. The Program studies seahorse life history, early development and has established breeding and rearing protocols for use in future wild stock enhancement programs. Through trips to the Reserve, the program has collected species and learned about their natural habitats.

Response: This is an example of how the Reserve is active in providing advisory services and attracting researchers to its components. The program provides relevant science to the community through its abundant resources and generous attitude towards partners.

Commenter: Yonathan Zohar, Ph.D
Professor and Director
Center of Marine Biotechnology (COMB)
University of Maryland Biotechnology Institute

Comments: Dr. Zohar wrote in support of the Reserve, its science programs, and coastal stewardship in conjunction with the COMB's Blue Crab Research Program. The Reserve has contributed to the efforts of the multi-state Blue Crab Advanced Research Consortium in applying science to coastal management and understanding estuarine ecosystems. The Consortium also includes the Smithsonian Environmental Research Center, University of Southern Mississippi, and North Carolina State University, as well as COMB. All of the Consortium states have NERRs as well.

Response: The Reserve program is commended for its role in the regional and national effort in these programs and another example of its accomplishments in partnering programs.